

California Landfills Impacted By Bag Bans

CALIFORNIA'S ZERO WASTE GOAL SUFFERS SETBACK AS MORE MATERIAL IS HEADED TO THE LANDFILL AN UNINTENDED CONSEQUENCE OF PLASTIC CARRYOUT BAG BANS

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Executive Summary

The Single-Use Carryout Bag Ordinance has a detrimental impact on landfills that has not been clearly identified. While the Environmental Impact Report (EIR) identifies that plastic carryout bags currently end up in the landfill, unbeknownst to proponents of the ordinance is that the amount of material deposited in the landfill after the ban has been implemented is far greater than before the ban. Landfill impacts for both the State of California and for Santa Barbara and Ventura Counties are presented in Tables 1 and 2 respectively. While landfills can absorb the additional material with no problem, an unintended consequence of the single-use carryout bag ordinance, it is California's Zero Waste Goal that suffers a setback that will have to be made up through other waste reductions!

Introduction

When communities implement single-use carryout bag ordinances the material composition of carryout bags change from largely (95%) plastic to paper and reusable shopping bags made from a variety of plastics and fabrics. (BEACON, 2013) As a result the composition of materials recycled and landfilled also changes. One direct consequence of a plastic bag ban is the increase in the amount of material that will end up in the landfill. This material includes the following: remaining plastic carryout bags, paper bags, reusable bags, replacement bags, and "other plastic". These materials are defined for clarification in the following subparagraphs:

Plastic Carryout Bags

A plastic carryout bag is the lightweight plastic shopping bag given to the consumer at the checkout stand to take their purchases home. The bag is made from either High Density Polyethylene (HDPE) or Low Density Polyethylene (LDPE) plastic and has built in handles that make the bag a popular item for reuse. Not all plastic carryout bags weigh the same, but for purposes of this paper we will assume that plastic carryout bags weigh 5.5 grams or 0.01213 lbs. each. According to the BEACON EIR, about 5% of plastic carryout bags will remain after the single-use carryout bag ordinance is implemented. (BEACON, 2013)

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Paper Carryout Bags

A recyclable paper bag has at least 40% post-consumer recycled content and weighs between 45 and 90 grams and has approximately 1.5 times the volume of plastic carryout bag. A paper bag from Trader Joe's weighs 67.47 grams or 2.38 ounces each and is the average weight for paper bags used in this paper.

Reusable Bags

Reusable bags come in small, medium, and large sizes and can hold 10, 25, and 35 lbs. respectively when filled. (Health & Safety Ontario , 2011, p. 6) The most common bags are made from non-woven polypropylene plastic and from cotton or Jute with handles and intended to be used multiple times. Reusable bags weigh between 50 and 200 grams. The weight of a reusable bags for purposes of this paper is assumed to be 6.8 ounces as weighed by Rincon Consultants on 8/10/2010. (BEACON, 2013, p. 4.3-12) The least common Reusable bags are made from LDPE or HDPE plastic which is nothing more than a thick plastic bag and represent less than 5% of the market. (BEACON, 2013, p. 8-144) Reusable bags are assumed to be used once per week for 52 weeks and have a lifespan of 1 year. (BEACON, 2013, p. 2-10)

Replacement Plastic Bags

A direct effect of a plastic carryout bag ban is the purchase of replacement plastic trash bags to line small trashcans, pick up pet litter, etc. About 40.3% of the plastic carryout bags are reused as trash bags and disposed of in the landfill and it is expected that consumers will purchase replacement plastic bags to fill this niche. (Edwards & Fry, 2011) For purposes of this article, a Replacement Plastic Bag is assumed to weigh the same as plastic carryout bag. The total number of replacement bags is equal to 40.3% of plastic carryout bags pre-ban. (Edwards & Fry, 2011)

"Other Plastic"

The In-Store Recycling Bin is primarily for recycling of plastic carryout bags. However, an added benefit is that "other plastic" bags and wraps can also be recycled in this bin including: produce bags, bread bags, newspaper bags, dry cleaning bags, and plastic wrap from toilet paper, paper towels, diapers, etc. This "other plastic" material is not accepted in the curbside recycling bins in most of the State of California and also Ventura County because it is uneconomical to recycle and the material get caught in the sorting machinery. In Santa Barbara County this material can be put in the curbside recycle bins. (Santa Barbara Public Works Department, 2012-2013) Hence, for Ventura County, this "other plastic" can only be recycled through the In-Store Recycling Bin. In 2009, only 2.9% of plastic bags issued were recovered through the In-Store Recycling Program. However, for every ton of plastic carryout bags that were recycled, 11.6 tons of "other plastic" was recovered preventing this material from ending up in the land fill. (CalRecycle, 2011)

Adverse impacts

The adverse impacts of a Single-Use Bag Ordinance are described below.

Most Reusable Bags Are Not Recyclable

Reusable bags made from LDPE and HDPE plastic are fully recyclable through the In-Store Recycling Bins. The majority of Reusable bags made from non-woven Polypropylene (PP) or fabrics such as cotton are not recyclable since no recycling facilities exist in the State of California or in Santa Barbara and Ventura Counties; hence, disposal is in the landfill. (Herrera Environmental Consultants, 2008) This is another example of an unintended consequence of a plastic bag ban, where a recyclable plastic carryout bag is replaced by a reusable bag that cannot be recycled!

In-Store Recycling Bin Shutdown

Under California State Law AB 2449 and SB 1219, retail stores that issue plastic carryout bags at the checkout stand have to provide an In-Store Recycling Bin so that customers can bring plastic carryout bags back for recycling. The cost of this recycling program is shouldered by customers through higher prices. When a plastic carryout bag ban is implemented, retail stores will no longer be legally required to retain the recycling bin. Stores are in business of selling groceries and not in the recycling business. In San Francisco, after a plastic bag ban went into effect many retail stores shut down their plastic bag recycling bins. (Brown, 2011) (The ULS Report, 2008) An unintended consequence of a plastic carryout bag ban is that “other plastic” collected for recycling will end up in the landfill if retail stores shut down the In-Store Recycling Bins and the material is not accepted in the curbside recycle bin. This paper assumes that the In-Store Recycling bins will be shut down.

Double Bagging Paper Bags

Double bagging at the checkout stand normally occurs when the customer purchases items that are heavy e.g. canned food, etc. Observations from one market shows that double bagging may occur as much as 40% to 80% of the time. While the weight of the items carried in the bag is one factor, the other factor is that the paper handles break off easily. Double bagging of paper bags is not taken into account in the analysis of landfill impacts.

Reusable Bag Proliferation

Proliferation of reusable bags is a perverse side effect of the plastic carryout bag ban. Customers purchase more reusable bags than they really need (for example, they don't have any with them on a spur of the moment shopping trip) or receive free bags during promotions. As a result, an extraordinary quantity of reusable bags will be disposed of in landfills. This occurred in Australia where the reusable bag has been dubbed the “new green monster” and grocery stores accomplices to the proliferation because they make money on every bag sold. (Munro, 2010) While Australia is far away, it is happening right here in the United States. (Strickler, 2013) Reusable Bag Proliferation is not taken into account in landfill impacts discussed in this paper.

Disposal of Carryout Bags and Landfill Impacts

When bags reach their end of life they are disposed of either by recycling or by disposal in the landfill. The BEACON EIR assumes 100% use of plastic carryout bags in the Study Area Pre Ban (BEACON, 2013) with 2.9% disposed of by recycling and 97.1% disposed of in the landfill. (CalRecycle, 2011) While we

recognize that there are people who use paper bags and reusable bags at the current time, there are no local bag usage statistics available for Santa Barbara and Ventura Counties that could have been used to model bag usage. Post Ban we are concerned with disposal of plastic carryout bags (the remaining 5%), paper bags, reusable bags, replacement bags, and “other plastic”.

State of California Landfill Impact

The impact to landfills is calculated using bag quantities derived from California’s population of 37,966,471 (as of 1 Jan 2013) and multiplying by 531 plastic carryout bags per person per year. A total of 20,160,196,101 plastic carryout bags were assumed Pre Ban. Post Ban it was assumed that 5% of plastic carryout bags or 1,008,009,805 would remain; 30%, would be replaced by 6,048,058,830 paper bags; and 65%, would be replaced by 252,002,451 reusable bags. 79% of paper bags were assumed to be landfilled with 21% recycled. (Green Cities California, 2010, p. 18) 97.1% of plastic carryout bags were assumed to be landfilled with 2.9% recovered through recycling. The Post Ban “other plastic” is calculated from the 2.9% of Pre Ban plastic carryout bags recycled multiplied by 11.6 times the weight of a single plastic carryout bag or 0.140708 lbs. per bag. (CalRecycle, 2011)

Post Ban/Pre Ban Ratio

The ratio of material deposited in the landfill Post Ban compared to the material deposited in the landfill Pre Ban is calculated as follows:

$$\text{Post Ban / Pre Ban Ratio} = \frac{\text{Post Ban Landfill Weight Deposited}}{\text{Pre Ban Landfill Weight Deposited}}$$

The Post Ban/Pre Ban Ratio as described in the above equation provides a figure of merit comparing the Post Ban versus the Pre Ban amount that is deposited in the landfill. The Post Ban/Pre Ban Ratio for the State of California is 4.21 in Table 1 and for Santa Barbara and Ventura Counties is also 4.17 in Table 2.

	Quantity	Weight per bag (lbs.)	Weight (lbs.)	Weight (tons)
Pre-Ban				
Plastic Carryout Bags	19,575,550,414	0.01213	237,451,426.52	118,725.71
Post Ban				
Plastic Carryout Bags	1,008,009,805	0.01213	12,227,158.94	6,113.58
Reusable Bags	252,002,451	0.42500	107,101,041.79	53,550.52
Paper Bags	4,838,447,064	0.14875	719,719,000.81	359,859.50
Replacement Bags	8,064,078,440	0.01213	97,817,271.48	48,908.64
Other Plastic	444,330,722	0.140708	62,520,887.24	31,260.44
Total				499,692.68
Post Ban /Pre Ban Ratio				4.21

Table 1. State of California Landfill Impacts

Santa Barbara and Ventura County Landfill Impacts

A total of 658,241,406 plastic carryout bags were assumed Pre Ban. Post Ban it was assumed that 5% of plastic carryout bags or 32,912,070 would remain; 30%, would be replaced by 197,472,422 paper bags; and 65%, would be replaced by 8,228,018 reusable bags. 79% of paper bags were assumed to be landfilled with 21% recycled. (Green Cities California, 2010, p. 18) 97.1% of plastic carryout bags were assumed to be landfilled with 2.9% recovered by recycling. The Post Ban “other plastic” is calculated from the 2.9% of Pre Ban plastic carryout bags recycled multiplied by 11.6 times the weight of a single plastic carryout bag or 0.140708 lbs. per bag and multiplied by 76% to account for Ventura County only based upon population. (CalRecycle, 2011)

	Quantity	Weight per bag (lbs.)	Weight (lbs.)	Weight (tons)
Pre-Ban				
Plastic Carryout Bags	639,152,405	0.01213	7,752,918.68	3,876.46
Post Ban				
Plastic Carryout Bags	32,912,070	0.01213	399,223.41	199.61
Reusable Bags	8,228,018	0.42500	3,496,907.84	1,748.45
Paper Bags	156,003,213	0.14875	23,205,477.97	11,602.74
Replacement Bags	263,296,562	0.01213	3,193,787.30	1,596.89
Other Plastic (Ventura County)	14,507,641	0.140708	2,041,341.09	1,020.67
Total				16,168.37
Post Ban /Pre Ban Ratio				4.17

Table 2. Santa Barbara and Ventura County Landfill Impacts

Summary of Landfill Impacts

Both Table 1 for the State of California and Table 2 for Santa Barbara and Ventura Counties show that for both geographic areas the amount of carryout bags and other material deposited in landfills after the ban is more than four times as much than before the ban. It should be understood that the quantities in Table 1 and Table 2 have not been adjusted for loss and other factors that reduce the actual amounts that end up in the landfill. Table 1 and Table 2, clearly show that an unintended consequence of the bag ban is an increase in the amount material deposited in the landfill. Furthermore, California’s Zero Waste Goal suffers a setback from the added material deposited in the landfills.

Even if you change some of the assumptions, you will still have more material going to the landfill Post Ban. For example:

- If you were to assume that the lifespan of reusable bag is two years vice one year, the weight of reusable bags in the tables will cut in half and the Post Ban/Pre Ban Ratio will not change substantially.

- If you ignore paper bags and consider only the remaining material, you still will have more material going into the landfill after the ban than before.
- If you consider the potential impact of *paper bag double bagging* and *reusable bag proliferation* the amount of material going to the landfill would be much more!

Recommendations

While Table 1 and Table 2 contain raw numbers, these tables are instructive in they can help us to identify strategies to reduce landfill amounts and mitigate the effects of the proposed ordinance. For Example, the following strategies could be initiated:

- Set a recycling goal for paper carryout bags at 60% vice the national average of 21%. A public education program will be needed.
- Modify the ordinance so that the Reusable Bags sold by retail stores in the Study Area must have an existing recycling infrastructure.
- Modify the curbside recycling program to allow for collection of clean plastic bags and wraps in the curbside recycling bin (material may have to be put in a bag and secured). Requires an education program.

The objective in the Environmental Impact Report to reduce the amount of single-use carryout bags in trash loads has failed. Therefore, it is recommended that the Plastic Carryout Bag Ban be dropped.

Conclusion

Since the plastic carryout bag ban intended to reduce the amount of material going to the landfill, the exact opposite has occurred instead. This is clearly a perverse unintended consequence of plastic bag bans.

About The Author

Anthony van Leeuwen is the founder of the [Fight The Plastic Bag Ban](http://fighttheplasticbagban.com) website and writes extensively on the subject. He holds a bachelor's and Master's degree in Electronics Engineering and has over 40 years of experience working in the federal government.

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